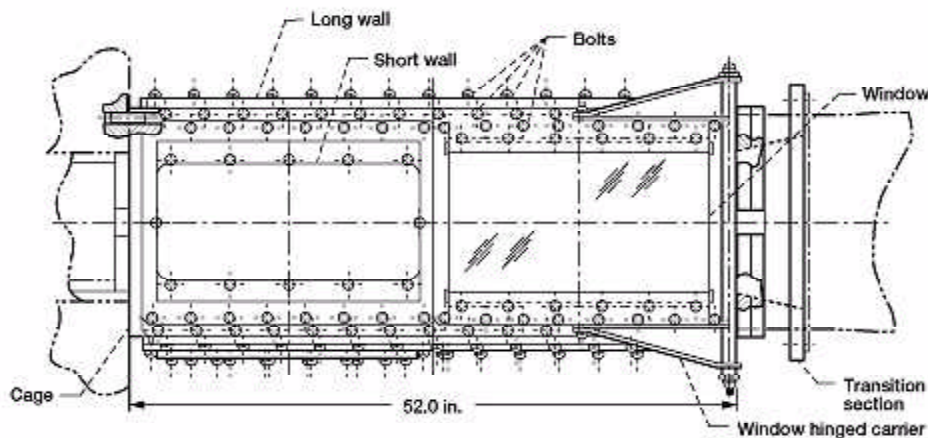


# New Test Section Installed in NASA Lewis' 1- by 1-Foot Supersonic Wind Tunnel

NASA Lewis Research Center's 1- by 1-Foot Supersonic Wind Tunnel (1x1) is a critical facility that fulfills the needs of important national programs. This tunnel supports supersonic and hypersonic research test projects for NASA, for other Government agencies, and for industry, such as the High Speed Research (HSR) and Space Transportation Technologies (STT) programs. The 1x1, which is located in Lewis' Building 37, Cell 1NW, was built in 1954 and was upgraded to provide Mach 6.0 capability in 1989. Since 1954, only minor improvements had been made to the test section.

To improve the 1x1's capabilities and meet the needs of these programs, Lewis recently redesigned and replaced the test section. The new test section has interchangeable window and wall inserts that allow easier and faster test configuration changes, thereby improving the adaptability and productivity of this highly utilized facility. In addition, both the wall and window areas are much larger. The larger walls provide more flexibility in how models are mounted and instrumented. The new window design vastly increases optical access to the research test hardware, which makes the use of advanced flow-visualization systems more effective.

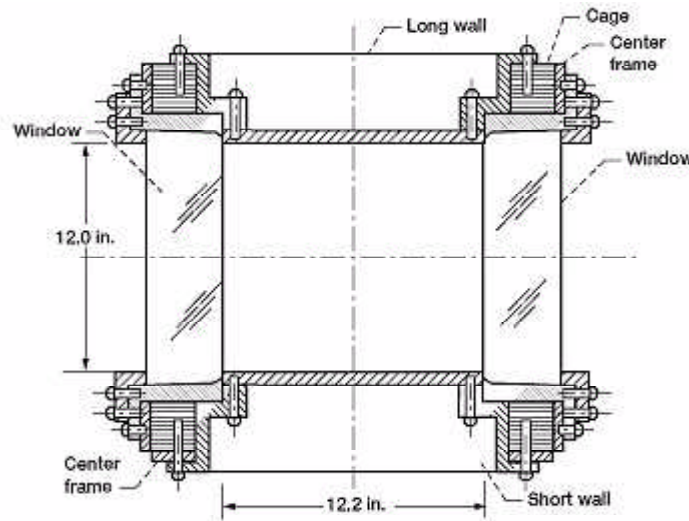


*Sideview of new test section.*

The new test section consists of a central frame, called the cage, which provides four identically sized, full-length openings in each of its four sides. This feature permits long walls to be interchangeably located in any position. The addition of a center frame, which divides any full-length cage opening into two identical openings and complements the structural integrity of the complete test section assembly, allows window or short wall inserts to be interchangeably located. Windows can be mounted tandem or across from one another, but not adjacent to (share a corner with) each other. Otherwise, any

mounting combination of inserts is possible. To provide uniform and flush flow-walls, which are critical to high-speed research testing, and to ensure interchangeability without individual alignment or shimming, we held the dimensional tolerances of all parts very tight. All the inserts were designed to maximize the wall panel and/or window area and to provide research engineers with the greatest amount of versatility.

The new windows provide 40 percent more area and are designed for use at all test conditions, including the hypersonic operating range through Mach 6.0. The window glass is made from a high-quality fused silica material that is transparent both for direct viewing and to advanced research flow-visualization instruments that use lasers and other special imaging techniques.



*Typical cross section of new test section.*

The long wall is of particular interest to research customers of the facility. Because it fills one full-length opening in the cage, the long wall offers unprecedented flexibility in both the mounting of models and the installation of special instrumentation. The long wall panel is a relatively simple and inexpensive part that can be used by customers to assemble and prepare their research test hardware in advance, outside of the tunnel test section. Now that the new test section is fully operational, many tests have been planned that will fully utilize the 1x1's unique, enhanced features.

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